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ABSTRACT

Following the recommendations of an external consultant, the nursing program and the division of research and evaluation at the Alberta Vocational Centre, Edmonton, designed and implemented pilot projects to test the Control Data PLATO system and PLATO Learning Management (PLM) software for computer-managed learning (CML) in the nursing assistant program. Positive results from the pilot tests of 11 students and observation of the September 1986 class led to application of PLATO CML with all subsequent regular and refresher students in the nursing assistant program in the 1986-87 academic year. Conclusions of the implementation project were as follows: (1) training and scheduling of nursing assistant program students was effectively and efficiently performed; (2) staff training made instructors comfortable with CML and capable of functioning as instructors in the PLATO environment; (3) the student schedule of four hours of PLATO access per day, while adequate, was perceived as too constraining by some students--evening hours were suggested; (4) present posttests were adequate, but expansion of the item bank by one-third was recommended; (5) students were quickly capable of using the PLATO system effectively and reported finding PLATO a useful and enjoyable experience; (6) incorporation of CML resulted in actual cost savings of one-third to one-half over manual, instructor-managed systems for onsite delivery of the program; and (7) the results of the CML project showed great promise for future expansion and extension to distance education. (The 30-page evaluation report is followed by the CML evaluation plan, terminal requirements, and checklist; learner's and instructor's versions of an orientation to CML module; and the pre- and posttest computer adaptation scale, with a table of results.) (KC)

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PLATO COMPUTER-MANAGED LEARNING REPORT

Summative Evaluation of PLATO Computer-Managed Learning in the Nursing Assistant Program

Alberta Vocational Centre, Edmonton

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Summative Evaluation of PLATO Computer-Managed Learning
in the
Nursing Assistant Program
April, 1987

EXECUTIVE SUMMARY

Following the recommendations of an external consultant (Montgomerie, 1985), the Nursing Assistant Program and the Division of Research and Evaluation, Alberta Vocational Centre, Edmonton, designed and implemented pilot projects to test the Control Data PLATO system, and PLATO Learning Management (PLM) software, for Computer-Managed Learning (CML) in the Nursing Assistant Program. Positive results from the pilots resulted in plans for CML implementation in the Nursing Assistant Program in September, 1986, with one class of Nursing Assistant Program students.

Successes with the September, 1986, class led to application of PLATO CML with all subsequent Nursing Assistant Program regular and Refresher students in the 1986-1987 academic year.

Conclusions of the implementation project were as follows:

Conclusion 1: All but one recommendation of the Montgomerie Report was met fully and one recommendation was met partially in the PLATO-based CML implementation projects. The unimplemented recommendation,

reiterated in this study, was for an institutional instructional design group (with project management responsibilities).

Conclusion 2: The project development process devised for the project and used from December, 1985, to November, 1986, successfully achieved the project's initial objectives.

Conclusion 3: Training and scheduling of Nursing Assistant Program students was effectively and efficiently performed. (While experience showed that all classes, including Refresher, could be accommodated with existing resources, there was evidence that resources were somewhat strained by the level of usage.)

Conclusion 4: Staff training achieved the goal of making instructors comfortable with CML and capable of functioning as instructors in the PLATO environment.

Conclusion 5: The student schedule of four hours of PLATO access per day, while adequate, was perceived as too constraining by some students. It was suggested that evening hours be initiated as soon as possible.

Conclusion 6: Present posttests were suitable for present purposes. Further expansion of the item bank by one-third was recommended.

Conclusion 7: Students were quickly capable of using the PLATO system effectively, and reported finding PLATO a useful and enjoyable experience.

Conclusion 8: Incorporation of CML resulted in actual cost savings of 1/3 to 1/2 over manual, instructor-managed systems for on-site delivery of the program.

Conclusion 9: The results of the CML project showed great promise for future expansion and refinement, both with regular on-site clientele and in off-site, distance delivery locations.

Conclusion 10: Further studies were recommended to answer remaining research questions concerning CML in this and other AVC programs.

SUMMATIVE EVALUATION OF PLATO COMPUTER-MANAGED LEARNING
in the
NURSING ASSISTANT PROGRAM
Alberta Vocational Centre, Edmonton
April, 1987

P. Fahy
Director, Research and Evaluation

Overview

In a study of the instructional computing needs of the Nursing Assistant Program conducted in 1985, the following conclusions were reached (Montgomerie, "Computer-Based Learning Investigation: Final Report", 1985);

Recommendation #1: Alberta Vocational Centre, Edmonton should incorporate Computer-Based Learning in the Nursing Assistant Program.

Recommendation #2: Implementation should be phased in. (This recommendation gave priority to Computer-Managed Learning, with Computer-Assisted Learning delayed "until the CML system is in place and working well" (Ibid., p. 85).

Recommendation #3: A team approach should be used. (Skills to include "content, instructional

design, knowledge of the CBL system, and management" (Ibid).

Recommendation #3A: A minimum half-time CBL Coordinator should be appointed (Ibid., p. 86).

Recommendation #3B: A centralized instructional design group should be established. (To provide instructional design expertise to the whole institution).

Recommendation #4: Computing facilities should be contracted from some other institution.

Recommendation #5: The PLATO CBL system should be used.

Recommendation #6: There should be no integration with the Student Information System at this time. (Computer-Managed Learning records should be kept "as day-to-day operational information".)

The present report describes efforts from December, 1985, to January, 1987, to implement the above recommendations.

Background

In autumn, 1985, preparations for implementation of the recommendations of the Montgomerie report commenced. In November,

1985, a Priority Employment Program (PEP) Aide was trained to use PLATO Learning Management (PLM) and commenced inputting posttest items, using existing test items developed for paper-and-pencil testing.

The first pilot project, comprising Modules 20 to 23 and six student participants, was conducted from January 13 to 17, 1986; the second, comprising Modules 66 to 69, and 74 to 76, with 5 students, occurred February 10 to 14, 1986.

As the inputting of posttest items went quickly and the results of the pilot projects were very positive, plans were made to conduct a third pilot commencing March 25, 1986, with a full class of 30 students over a complete level (Level 1) of the curriculum. Because telecommunications equipment was not installed in time, however, this pilot did not occur. Nevertheless, on the basis of previous successes, the decision was made to proceed with planning for full-scale implementation of CML in September, 1986, and the time from March to September was used to develop a detailed description of Computer Managed Learning components (see Attachment C).

Methodology

Evaluation of the Project was planned to occur over the term during which the first (September) class was enrolled, September, 1986, to May, 1987 (see Evaluation Plan, Attachment A). However, withdrawal by the Nursing Assistant Program of the services of the

CML manager (see below) resulted in a truncated evaluation and deletion of several research objectives. The effective term of the evaluation was thus December, 1985, to January, 1987, with emphasis on the first part of the implementation phase, September, 1986, to January, 1987.

Evaluation objectives which were addressed during this period include the following: (see Attachment A):

1. Train and schedule the September Nursing Assistant class in use of the PLATO-based module posttests and CML package.

   1.1 Because of the success of this implementation, all classes since September, 1986, have used PLATO CML. This report will provide information on some of the experiences of the September, October, and December, 1986, and February, 1987, classes.

2. Observe students in the CML testing environment and make adjustments to training, scheduling and materials as needed.

3. Document some of the perceived effects of CML from the instructors' perspectives.

4. Document some of the perceived effects of CML on students' attitudes.

5. Define the roles of team members: Project Manager, Project Coordinator, paraprofessionals, content specialists, instructional designers, CML specialists.

6. Document components of the total CML package and their costs, in comparison with alternatives.

Data were gathered throughout the project by the Division of Research & Evaluation, and, until her reassignment, by the Nursing Assistant Program CML Project Manager. PLATO records provided information on times and patterns of use; observation and student comments were sources of anecdotal information. Questionnaires were administered in November and December, 1986, and in February, 1987, to assess students' initial and later attitudes (Attachments E and F), and students and staff participated separately in group interviews in February, 1987.

Findings

Objective 1: Scheduling and training of students in Computer-Managed Learning (CML)

Pilot project data indicated that students required 8 to 10 minutes of terminal time per module posttest, not including retest time. A schedule was developed providing 15 minutes per session per student, and estimates of terminal time required for each week of the year were made (see Attachment B). Projections indicated that if students used 15 minutes per test there would be 10 weeks in the year when students would require more than 3.5 hours of daily access per terminal in order to complete testing for the week. There would thus be 10 weeks in which resources would be

severely strained. Table 1 compares actual and projected activity levels for the period September, 1986, to January, 1987.

Table 1: Projected and Actual PLATO Activity Levels, Nursing Assistant Program, September, 1986, to January, 1987.

	Active Students			# of Sessions			Total Hours			Average Terminal Hours		
Month	Projected	Actual	% Diff.*	Projected	Actual	% Diff.*	Projected	Actual	% Diff.*	Projected	Actual	% Diff.*
September, 1986	30	31	103%	720	775	108%	156.2	145.7	93%	1.24	1.16	94%
October	60	75	125%	570	560	98%	156	129.3	83%	1.3	1.08	83%
November	60	74	123%	960	1035	108%	256.5	270.2	105%	2.25	2.37	105%
December	90	104	116%	990	682	69%	211.7	82.6	39%	2.08	0.81	39%
January, 1987	90	89	99%	1560	1045	67%	412.7	237.7	58%	3.28	1.89	58%
TOTAL/AVG	66	74.6	113%	4800	4097	85%	1193.1	865.5	73%	2.03	1.462	72%

*Actual as percent of projected.

The major conclusion supported by Table 1 is that while the number of students using PLATO CML was 13% higher than expected (due primarily to inclusion of 17 refresher students in November, 1986), the number of sessions was 15% less, the total number of hours 27% less, and the average number of terminal hours per day 28% less than projected. The probable explanation for the discrepancy between actual and projected totals is that the pilot projects on which the projections were based represented student performance early in the learning curve; when students became more comfortable and proficient with the system their efficiency increased and the time required decreased. (If it is true that estimates were approximately 25% too generous, it is possible that

12 minute test sessions could be initiated. However, as will be noted below, students would not support such a decision).

Students' training in use of PLATO CML consisted of one in-class orientation to CML concepts such as self-pacing and self-direction, and to basic rules for the course (see Attachment D), followed immediately by a hands-on session at the PLATO terminal in which students worked in pairs or trios to complete a demonstration module. After orientation students were free to schedule themselves for testing on the first modules of Level 1.

The CML lab was available to the students at the following times:

7:30 - 8:30 a.m.
12:00 - 1:00 p.m.
2:30 - 4:30 p.m.

Daily scheduling was by reservation of a 15 minute testing block using a sheet posted outside the terminal room. Ordinarily, students were not permitted to reserve two consecutive test blocks, nor to reserve time more than one day in advance. Specific times of the day were sometimes reserved for individual classes to assure that students within each class would have sufficient time to complete required tests. Students were asked to cancel their reservations if unable to keep them; to minimize the impact of failed appointments a policy was adopted allowing a two-minute grace period, after which a waiting student could sign on.

Initially, the CML lab was supervised at all times by an instructor. Later, instructional assistants took part as well. Still later, unsupervised times were initiated, during which an "honor system" was invoked. (Due to the early termination of the research phase of the project, causes of problems with unsupervised CML use, though detected, were not assessed.)

Objective 2: Adjustments to the CML Environment

Training Adjustments. No major gaps in student CML training were identified. Individual students received more attention if they appeared to require it. Overall, it appeared that the training system as described in Attachment D was adequate.

Scheduling. In December, a decision by the Nursing Assistant Program to close the CML lab from 12:00 to 1:00 made CML unavailable during the period most heavily used and preferred by students. The problems caused for students by this decision were partially addressed by assignment of staff from the Division of Research and Evaluation, permitting the lab to open from 12:30 to 1:00 p.m. daily. After further discussion with the Nursing Assistant Program, the decision was reached to resume Nursing Assistant Program supervision of the lab from 12:00 to 12:30 each day, beginning in February, 1987.

Student reaction to closing of the noon hour time period was immediate and definite, and the issue of scheduling was mentioned in all four class interviews. Students made these points:

1. In general, the schedule mitigated against students who could not come early or stay late in the instructional day, a condition exacerbated when the noon hour was lost.

2. The noon hour time period was generally felt to be the most desirable, as one hour for lunch was thought by most students to be too long.

3. Many students would use evening sessions for CML activities if they were available.

4. Students found the fifteen minute test block to be minimal for useful work; they did not believe 12 minutes would be adequate. Several students requested longer sessions, pointing out the Refresher students had one-half hour time blocks in which to complete their testing.

Materials. Overall, 62% of the allotted capacity of the Nursing Assistant Program PLATO test bank is presently used (see Table 6).

Table 6: Test Bank Description

Modules	Bank A	Bank B	Total Bank	Total Mastery	Total Used	% Used
1-19	204	101	305	161	209	62
20-39C	312	104	416	197	261	53
40-57C	255	112	367	190	242	55
58-70	236	85	321	145	181	68
71-85	198	93	291	134	173	62
86A-90B	120	38	158	68	81	72
TOTAL	1325	533	1858	895	1147	62

While no new test items were added to the bank during the research phase, errors in test items were corrected by Research and Evaluation staff and the CML Manager as they were identified. Further efforts to identify or create off-line materials to serve as instructional prescriptions, essentials of the CML package (see Attachment C), remain to be expended.

Objective 3: Effects of CML on Instructors

Six instructors involved in the CML project were interviewed in February, 1987. As in the student interviews, two areas of focus were defined: what benefits were occurring from CML, and what changes, suggestions, or problems would they identify.

Instructors were emphatically positive about CML. Advantages included:

1. Fewer testing/retesting clerical duties for instructors and consequently more time for instruction.

2. Less stress for students in testing.

3. Less time taken up in irrelevant debate in class about test items.

4. More student responsibility for learning.

5. (Especially for Refresher students) more efficient use of scarce on-site time.

Instructors were also positive about their own and the students' use of performance records produced by PLATO. They felt these records kept them well informed and gave students a clear sense of their own achievement.

No serious problems emerged from the staff interview. However, these suggestions were made:

1. Students need to be reminded about "schedule etiquette". (Over-staying their time or failing to respect others' times were occasional problems.)

2. Cheating during unsupervised periods may be/become a problem (the purpose of the module posttests as a study aid should be reiterated).

3. Students failing to master a module should be advised to study prior to rewriting.

Objective 4: Effects of CML on Students' Attitudes and Behavior

The October and December, 1986, and February, 1987, classes completed a pretest Computer Adaptation Scale during their orientation, prior to any use of PLATO, and a posttest Computer Adaptation Scale after completing Level 1, approximately 6 weeks later (Attachments E & F). (The September class completed the post-tests only). Table 2 shows pre- and post- use rankings of the questionnaire's 12 items.

Table 2: Pre- and Posttest Rankings of Student Questionnaire Items

I THINK/FOUND USING A COMPUTER FOR TESTING ...	Pre-use average	Post-use average	Difference	Pre Rank	Post Rank
1. would make/made me nervous	2.32	2.21	-0.11	8	8
2. would be/was easy	2.97	3.05	0.08	5	5
3. would be/was slower than paper and pencil	1.68	1.37	-0.31	12	12
4. would be/was too impersonal	1.97	1.94	-0.03	9	9
5. would make/made me feel too isolated	1.77	1.68	-0.09	11	11
6. would be/was more flexible	2.66	3	0.34	6	6
7. would be/was more efficient use of my time	3.21	3.41	0.2	1	1
8. would be/was satisfying	3.01	3.08	0.07	4	4
9. would be/was frustrating	1.97	1.79	-0.18	10	10
10. would be/was interesting	3.2	3.36	0.16	2	2
11. would/did improve my knowledge of the subject	2.52	2.7	0.18	7	7
12. would be/was enjoyable	3.13	3.22	0.09	3	3

Scale: 4 = Strongly Agree, 3 = Agree, 2 = Disagree, 1 = Strongly Disagree

Table 2 shows that the most positive ratings (all of which were increased by experienced with PLATO) were given for these items (mean rank in parentheses):

- 7. PLATO testing was more efficient use of time (3.41)
- 10. PLATO testing was interesting (3.36)
- 12. PLATO testing was enjoyable (3.22)
- 8. PLATO testing was satisfying (3.08)

The least agreement was expressed for these items, all of which received even less agreement after PLATO experience:

- 3. PLATO was slower than paper-and-pencil testing (1.37)
- 5. PLATO made me feel too isolated (1.68)
- 9. PLATO was frustrating (1.79)
- 4. PLATO was too impersonal (1.94)
- 1. PLATO made me nervous (2.21)

In summary, experience strengthened students' opinions that: PLATO was an efficient use of their time, was enjoyable, was interesting, and was satisfying; PLATO was not slower than paper-and-pencil testing, did not make them nervous, was not too impersonal, did not make them feel isolated, and was not frustrating.

(See Attachment G for a class-by-class comparison of questionnaire results.)

In addition to the questionnaire, students in the September, October and December, 1986, and February, 1987, class were interviewed in class groups regarding their PLATO experiences. Both positive elements and suggestions for change were solicited.

Students reported that the benefits of PLATO CML were:

1. Testing was available when the student was ready.
2. There was less stress.
3. Instant feedback was helpful.
4. Self-pacing was helpful.
5. Review was valuable.
6. PLATO was orderly, logical, and very friendly.

Suggestions for improvements included the following:

1. There should be more terminals.
2. There should be more testing time (ie., during lab testing when students wait to be performance tested).
3. There should be more privacy (ie., dividers between terminals).
4. There should be better noise insulation from adjacent and classrooms and hallways.

5. There should be more access to PLATO during clinical weeks for those who wish to come back into the institution after work.

6. Testing blocks should be longer (up to 1/2 hour).

7. Staff should not watch students over-the-shoulder while they are testing.

8. There should be more opportunity for review.

9. PLATO should be available earlier and later in the day, including evenings.

Another finding related to student use of CML for self-pacing is contained in Tables 3 & 4.

Table 3: September, 1986, Nursing Assistant Class.

Survey Date	Number of Students	Behind Schedule*		On Schedule*		Ahead of Schedule*	
		#	%	#	%	#	%
September 11, 1986	30	9	30%	18	60%	4	0.13
September 18	30	11	37%	8	27%	12	0.4
September 25	30	3	10%	9	30%	19	0.63
October 16	30	7	23%	9	30%	14	0.47
October 30	30	10	33%	11	37%	9	0.3
November 18	30	7	23%	11	37%	12	0.4
November 27	30	15	50%	9	30%	6	0.2
December 11	26	5	19%	17	65%	4	0.15
January 2	26	8	31%	12	46%	5	0.19
January 15	25	5	20%	7	28%	13	0.52
January 30	23	15	65%	8	35%	0	0
TOTAL/AVG	28.2	7.3	31%	9.2	39%	7.5	31%

*According to the daily schedule.

Table 4: November, 1986, Nursing Assistant Class.

Survey Date	Number of Students	Behind Schedule*		On Schedule*		Ahead of Schedule*	
		#	%	#	%	#	%
October 30	30	27	90%	3	10%	0	0%
November 7	30	9	30%	5	17%	16	53%
November 20	30	2	7%	8	27%	20	67%
November 28	30	21	70%,	8	27%	1	3%
December 5	29	9	31%	8	28%	13	45%
December 18	30	5	17%	11	37%	14	47%
January 2	29	1	3%	12	41%	16	55%
January 8	29	15	52%	9	31%	5	17%
January 23	28	8	29%	17	61%	3	11%
TOTAL/AVG	29.4	10.8	37%	9.0	31%	9.8	33%

*According to the daily schedule.

Tables 3 and 4 show that students in these two classes maintained different paces as they moved through the curriculum: approximately 1/3 were slightly behind the scheduled pace, 1/3 were on schedule, and 1/3 were slightly (or in some cases considerably) ahead of schedule. These findings corroborate a major contention of Bloom (Human Characteristics and School Learning, 1976) that, when time is variable but achievement constant (as in competency-based learning), students will find a personally suitable learning pace which may vary markedly from the group average.

Objective 6: Role of Team Members

As noted earlier, recommendation 3 of the Montgomerie report was that a team approach should be employed in developing Computer-Based Learning, to include expertise in "content, instructional design, knowledge of the CBL system, and management" (Ibid., p. 85).

In the pilot projects and the implementation project the Director of Research and Evaluation supplied expertise in curriculum design and the PLATO system, the Nursing Assistant Program provided content expertise and day-to-day coordination in the person of the Nursing Assistant Program Computer-Managed Learning Manager, and management was comprised of representatives of the Nursing Assistant Program, Research and Evaluation, and the institution's senior administration.

The experience of this implementation has shown that the following tasks are associated with these roles:

Program Content Expert:

1. Develop, revise, and correct test items.
2. Produce training/orientation schedules and materials for students and staff.
3. Monitor needs for and uses of system records.
4. Train and supervise paraprofessionals.

5. Identify needs for and acquire off-line learning resources.

6. Monitor system student notes and refer/reply.

7. Monitor system reliability.

8. Identify evaluation needs.

Instructional Designer

1. Validate test items.

2. Develop and monitor system for test item generation, testing, review, revision and installation.

3. Document intended learning goals and objectives, and actual outcomes.

4. Assess impact of CBL on total learning system and suggest action to maximize results.

5. Plan and conduct evaluation.

6. Disseminate outcomes.

CBL Expert

1. Act as PLATO Account Director (create groups, sign-ons, set accesses, etc.)

2. Acquire and install computer resources (hardware and software).

3. Train program content experts and instructional designers as needed.

4. Assist in design and evaluation.

5. Acquire, install and monitor telecommunications equipment.

6. Select appropriate delivery media.

7. Supervise input and revision of test items.

8. Monitor system (hardware and software) performance.

Management

1. Approve project plan, evaluation plan; allocate resources.

2. Assign staff.

3. Review results, costs, resource requirements.

4. Consider implications.

5. Plan for installation and maintenance of the system.

Paraprofessionals

1. Supervise CML lab.

2. Input new items, revise existing items, as directed.

3. Print and distribute records.

4. Print and forward student notes requiring instructor attention.

5. Input materials, as directed.

6. Perform other maintenance and clerical tasks as required.

7. Post, monitor and manage terminal schedule.

8. Assist with orientation of new students.

Components of the CML Environment

Attachment C contains a listing of personnel, hardware, furnishings, software, courseware, telecommunications and training/orientation requirements of a fully-developed CML application. Due to the early termination of the research phase of this study further evaluation of these components was not possible.

Table 5 shows a comparison of costs of PLATO-based CML and two other forms of delivery of the Nursing Assistant Program, one in which posttests were manually administered, scored and results recorded ("paper-and-pencil without scanner"), and another in which an optical scanner was used to score and record results.

Table 5: Costs of PLATO-based CML and Other Delivery Modes, Nursing Assistant Program, AVC Edmonton

Delivery Component	Total Monthly Charges*		NA Program Share*		Paper and Pencil, with scanner		Paper and Pencil, without scanner	
Hardware	$765.00	(Note 1)	$306.00		nil		nil	
Software	nil		nil		$150.00	(Note 2)	$50.00	
Telecommunications	$132.50	(Note 3)	$53.00		nil		nil	
Subscriptions	$1050.00	(Note 4)	$420.00					
Staffing								
.Supervision of tests	$623.63	(Note 5)	$207.80	(Note 6)	$965.16	(Note 7)	$965.16	(Note 7)
.Scanning, scoring and recordkeeping	nil		nil		$71.00	(Note 8)	$1008.00	(Note 9)
Student allowances	nil	(Note 10)	nil	(Note 11)	$650.00	(Note 11)	$650.00	(Note 11)
TOTAL MONTHLY COSTS (AVG)	$2571.13		$986.80		$1836.16		$2673.16	
MONTHLY AVERAGE PER STUDENT**	$17.14		$6.58		$12.24		$17.82	

*As the Nursing Assistant program uses PLATO CML 3 hours per day (average) the amount 'charged' is three-eighths (40%) of the 'actual' amount.
**Assumes 150 students per year. Includes Refresher students (25 in 1986-87).

Note 1: Terminals at $2750 each x 6, amortized over 5 years = $275/month. Monthly maintenance at $60 per terminal, $30 for modem and multiplexer = $390 per month. Extra file parts = $100 per month.
Note 2: Paper, printing, optical scanner answer sheets.
Note 3: Conditioned telephone line (no charge: paid by APWSS). Multiplexers (2) at $2960 each, over 5 years = $89.67 per month. Modem at $2570, over 5 years = $42.83 per month.
Note 4: Subscriptions at $350 per month each x 3 = $1050. (While AVC pays for 3 subscriptions, access is provided to 6 subscriptions on the understanding that usage maxima and minima will not exceed fulltime use of 3 subscriptions.
Note 5: Instructional Assistant time: $10.39 per hour x 60 hours per month (3 hours per day) = $623.63.
Note 6: Actual time charged is for 1 hour per day.
Note 7: Instructor time: 20.5 hours per month (41 tests (average) per month x 30 minutes per test) x $47.08 per instructor contact hour (80 instructor contact hours per month, 10 months per instructor work year, $37665 per instructor work year (1986 average Program instructor salary)).
Note 8: Instructional Assistant, clerical time: 10 minutes per test, 41 tests (average) per month, $10.39 per hour = $71.00.
Note 9: Instructional Assistant time: 80 hours x $12.60 per hour (rate for former Instructional Assistant) = $1008.00.
Note 10: All CML testing currently done outside of class time.
Note 11: 104 total tests per student at 30 minutes (average) per in-class test = 52 student class hours x 150 students (not including Refresher) x $1 per student class hour (average sponsorship rate, Nursing Assistant Program students, 1985-86) divided by 12.

The following points may be made based on the data in Table 5:

1. While the use of the optical scanner materially lowered the average monthly testing and record keeping cost per student (from $17.82 to $12.24 per month), it did not produce conditions permitting student self-direction or self-pacing.

2. In paper-and-pencil testing, both with and without use of the optical scanner, approximately 10% (52 hrs.) of the students' total in-class time was given over to test administration, marking and discussion. In PLATO-based CML all of this time is recovered, while total testing time (all of which occurs outside of class time) is reduced, perhaps as much as 60% (exact figures will be available in May, 1987).

3. CML permits student self-direction and self-pacing. Students in fact do take advantage of this capability (see Tables 3 and 4 above), and voice approval of it (see above, students' attitudes and practices).

4. Presently, PLATO resources are used approximately 3 hours per day, leaving 5 hours per day available (not including evenings). The Transitional-Vocational program uses approximately 2 hours per day, for 5 months of the year. Thus there is unused PLATO capacity for other programs, and such use would reduce the per capita and per hour costs of the system.

5. Presently, $207.80 per month is expended for Nursing Assistant Program test supervision, consisting of 1 hour per day spent by the Instructional Assistant in the CML lab. (Supervision by instructors, as it is not considered "contact time," is not charged). It may not be necessary to supervise the lab constantly - the School of Nursing, the University of Alberta, provides 100% unsupervised PLATO CML time to its students (see Recommendation 3.4, below).

Conclusions and Recommendations

Conclusion 1: All but one recommendation of the Montgomerie report (1985) were met fully and one recommendation met partially in this PLATO-based CML implementation. The recommendations fully met were:

1.1 CBL was incorporated in the Nursing Assistant Program.

1.2 CML was incorporated before CAL.

1.3 A team approach to development and implementation was used.

1.4 A full-time CBL Coordinator was appointed. (Montgomerie's recommendation was that a half-time coordinator be appointed. For most of

this project, a full-time coordinator was available.)

1.5 Computing facilities were contracted from another institution (the University of Alberta).

1.6 The PLATO CBL system was used.

1.7 No attempt was made to integrate CML records with the Student Information System.

One recommendation was not met:

1.8 A centralized instructional design group was not established.

Recommendation 1.1 A centralized instructional design unit with responsibility and capabilities for project development should be established.

Conclusion 2: The evaluation process in place from December, 1985, to November, 1986, was successful. In November, 1986, changes to the project team and to research conditions initiated by the Nursing Assistant Program resulted in limitations of student access to CML resources and disrupted communication patterns among CML team members.

These developments forced premature termination of the research phase of the project.

Recommendation 2.1: An instructional development team, as described by Montgomerie, should be used in CML project development, comprising content, instructional design, and computing expertise.

Recommendation 2.2: During implementation of research projects by the Division of Research and Evaluation, involved program team members should be seconded to the Division.

Recommendation 2.3: During the research phase of projects, development and implementation processes should be the coordinated by the Division of Research and Evaluation.

Conclusion 3: Training and scheduling of five regular and two Refresher classes of Nursing Assistant Program students was effectively and efficiently performed. Experience showed that this number of students (approximately 175) could be accommodated as scheduled within existing resources.

Recommendation 3.1: All regular and on-site Refresher Nursing Assistant classes should use PLATO CML henceforth.

Recommendation 3.2: The present student orientation materials and program should be used. However, the optimum amount of time and resources for student training should be assessed further and the orientation process revised. (Student use of notes, "term-comments," and various records [Grade Book] should be investigated.)

Recommendation 3.3 Optimum terminal time requirements should be assessed to assure maximum efficiency in allocation of resources, balanced by respect for students' preferences.

Recommendation 3.4: Use of unsupervised CML time should be investigated.

Recommendation 3.5: The possibility of providing more "prime" testing time (between 9:00 a.m. and 3:00 p.m.) should be investigated, especially for students unable to access early and late times.

Recommendation 3.6: Use of time saved by CML (approximately 50 hours of class time formerly used for in-class testing) should be described.

Conclusion 4: Staff training achieved the goal of making instructors comfortable with CML, and capable of using Instructor utilities.

Recommendation 4.1: Present staff training components (manual and on-line orientation) should be maintained. The usefulness and effectiveness of various components should continue to be assessed and the process revised as required.

Conclusion 5: The present student schedule (7:30 - 8:30 a.m., 12:00 - 1:00 p.m., 2:30 - 4:30 p.m.; total 4 hours per day) is adequate; however, in the opinion of some students it should be supplemented by evening availability.

Recommendation 5.1: PLATO terminals (perhaps located in the LRC) should be available to Nursing Assistant Program students after 4:30 p.m.

Conclusion 6: Present posttests were suitable for present purposes. However, only two-thirds of available PLATO file space was used by the 1863 questions in the present item bank.

Recommendation 6.1: Selective item analysis should be done on present items and revisions made as necessary.

Recommendation 6.2: New posttest items should be written to supplement the item bank, until the bank is approximately 90% full. (Approximately 1000 additional items could be accommodated in the bank. Modules which item analysis show would benefit most from the additional items should receive attention first.)

Conclusion 7: Students were quickly capable of using the system effectively, and reported finding PLATO a useful and enjoyable experience.

Recommendation 7.1: Other possible users of the CML materials should be identified, especially where flexible delivery/access are desired, and where students present a range of characteristics and motivations.

Recommendation 7.2: Where off-site users are identified, pilot projects should be developed, as in this study, to test the utility and appropriateness of the present PLATO CML system.

Conclusion 8: Incorporation of CML resulted in actual cost savings for on-site delivery of this program.

Recommendation 8.1: The extent to which costs could be reduced further (i.e., by use of unsupervised time; see Recommendation 3.4) should be investigated.

Recommendation 8.2: Potential cost reductions for off-site implementations should be investigated.

Conclusion 9: The results of the CML project support off-site use of these materials and procedures, with adjustments and modifications for local conditions.

Recommendation 9.1: Elements of the CML environment not included in this implementation and appropriate to off-site needs should be incorporated as soon as possible (Attachment C).

Recommendation 9.2: Cost savings or greater efficiences with CML should continue to be sought, either by shortening of the program or by addition of components not now included.

Recommendation 9.3: Advantages of student self-pacing and self-direction should be measured and,

where possible, quantified (i.e. in terms of student satisfaction, lower termination rates, more self-assurance, appeal to a wider student clientele, better preparation, etc.)

Recommendation 9.4 Off-site implementation of CML should be systematically planned and implemented, to accrue the advantages identified in this study.

Conclusion 10: A number of research questions were not addressed in this truncated evaluation. The following are questions which should be addressed:

10.1 How do students use unsupervised CML time?

10.2 What is the relationship between success indicators (level exam scores, clinical performance, etc.) and CML outcomes?

10.3 What use could be made of on-line or scanner-based item analysis information in revision of the existing test bank?

10.4 Which CML resources (including but not limited to those in Attachment C) are cost effective enhancements to the instructional program?

10.5 What changes to staff roles occur as the CML package matures?

10.6 What alternate technology (Micro PLM) could be used to supplement or replace on-line PLM, on-site and off-site?

10.7 What information is required in planning further use of CML, on-site and off-site? What research should be conducted to acquire this information?

Attachment A

Evaluation Plan
Nursing Assistant Program Computer-Managed Learning Implementation
September, 1986
P. Fahy
Director, Research and Evaluation
July, 1986

Goal

To implement computer-managed learning (CML) via PLATO with a complete class of Nursing Assistants.

Objectives

1. Train and schedule the September Nursing Assistant class in use of PLATO-based module posttests.

2. Observe students in the CML testing environment and make adjustments to training, scheduling, and materials as needed.

3. Determine the effect of the CML learning environment on the instructor's role.

4. Determine the effect of the CML learning environment on students' attitudes.
   4.1 Self-direction
   4.2 Motivation

5. Determine the effect of the CML learning environment on time utilization for learning activities other than testing.
   5.1 Lab Practice
   5.2 Self-study
   5.3 Classroom
   5.4 Other media

6. Determine the effect of CML on the Educational Assistant's role.
   6.1 Recordkeeping
   6.2 CML Lab Supervision

7. Determine the time utilized in CML for various recordkeeping tasks.
   7.1 Archiving
   7.2 Weekly report generation
   7.3 Performance test results inputing

8. Determine the effect of CML on the success rate of students on posttests

.../2

Methodology

The following five methodologies will be used to gather data for evaluating the success of this project (See also Appendix A).

1. Checklists, questionnaires, surveys, logs
2. Observations and comparisons
3. Analysis of test data (item-analysis)
4. Interviews and discussions
5. Voluntary recommendations of students, instructors, aides, and the manager

Timeline

The overall time-frame within which this evaluation will be conducted is September 2, 1986 - May 29, 1987 (the term during which the September Nursing Assistant class will be enrolled). The evaluation will consist of three levels corresponding with the three levels of the program for the September class:

Level I - September 2-October 10;
Level II - October 13-January 23, 1987;
Level III - January 26-May 29.

Budget

The primary expenses associated with this evaluation are the time required of the Division of Research and Evaluation and the CML Manager, Nursing Assistant Program. Research and Evaluation staff will reserve time as follows:

Level I - 40%
Level II - 20%
Level III - 20%

Appendix A

Objective	Evaluation Method(s) 1	2	3	4	5
1	x	x		x	x
2		x	x	x	x
3	x			x	x
4.1				x	x
4.2	x	x		x	x
5.1	x	x		x	x
5.2	x	x		x	x
5.3	x	x		x	x
5.4	x	x		x	x
6.1	x	x		x	x
6.2	x	x		x	x
7.1	x	x		x	x
7.2	x			x	x
7.3	x	x		x	x
8			x		

Terminal Requirements for CML

CLASS	N	Sept					Oct				Nov				Dec					Jan				Feb				Mar		
		2*	8	15	22	29	6	13*	20	27	3	10*	17	24	1	8	15	22**	29	5	12	19	26	2	9	16	23	2	9	16
Week #		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		18	19	20	21	22	23	24	25	26	27	28
SEPT 2/86	30	2	6	4	7	5	3	5	0	4	0	7	0	6	0	9	0	4		0	8	0	8	0	6	0	4	0	7	0
Week #									1	2	3	4	5	6	7	8	9	10		11	12	13	14	15	16	17	18	19	20	21
OCT 20/86	30								2	5	4	7	5	3	6	0	3	0		8	0	7	0	7	0	9	0	6	0	9
Week #																1	2	3		4	5	6	7	8	9	10	11	12	13	14
DEC 8/86	30															2	5	4		7	5	3	6	0	3	0	8	0	7	0
Week #																								1	2	3	4	5	6	7
FEB 2/87	30																							2	5	4	7	5	3	6
Week #																														
MAR 23/87	30																													
Total Test Sessions:		60	180	120	210	150	90	150	60	270	120	420	150	270	180	330	240	240	0	450	390	300	420	270	420	390	570	330	510	450
Hours of Daily Use Each Term.		0.6	1.5	1	1.8	1.3	0.8	1.6	0.5	2.3	1	4.4	1.3	2.3	1.5	2.8	2	2	0	3.8	3.3	2.5	3.5	2.3	3.5	3.3	4.8	2.8	4.3	3.8

*4-day week.
**2-day week.

December, 1986

Apr					May				Jun					Jul				Aug					Sep				Oct			
23	30	6	13*	20*	27	4	11	18	25*	1	8	15	22	29*	6	13	20	27	3	10	17	24	31	7	14	21	28	5	12	19	25
29	30	31	32	33	34	35	36	37	38 [Grad May 29]																						
5	0	2	0	0	0																										
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38 [Grad July 17]															
0	3	0	3	0	7	0	5	0	2	0	0	0																			
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38 [Grad Sept 4]								
7	0	9	0	6	0	9	0	3	0	3	0	7	0	5	0	2	0	0	0												
8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
0	3	0	8	0	7	0	7	0	9	0	6	0	9	0	3	0	3	0	7	0	5	0	2	0	0	0					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
2	5	4	7	5	3	6	0	3	0	8	0	7	0	7	0	9	0	6	0	9	0	3	0	3	0	7	0	5	0	2	0
420	330	450	540	330	510	450	360	180	330	330	180	420	270	360	90	330	90	180	210	270	150	90	60	90	0	210	0	150	0	60	0
3.5	2.8	3.8	5.6	3.4	4.3	3.8	3	1.5	3.4	2.8	1.5	3.5	2.3	3.8	0.8	2.8	0.8	1.5	1.8	2.3	1.3	0.8	0.5	0.8	0	1.8	0	1.3	0	0.5	0

Attachment C

CML Checklist

	Complete
1. Personnel	
1.1 Instructors	
1.1.1 Describe role, duties of participants	_____
1.1.2 Develop specific orientation modules for participants	_____
1.1.3 Arrange information sessions for staff	_____
1.1.4 Keep log of activities	
1.1.5 Evaluate	_____
1.1.6 Revise	_____
1.1.7 Document	_____
1.2 Aide(s)	
1.2.1 Describe role, duties	_____
1.2.2 Plan and conduct orientation	_____
1.2.3 Plan and conduct detailed training	_____
1.2.4 Establish reporting/supervision	_____
1.2.5 Evaluate	_____
1.2.6 Upgrade training as needed	_____
1.2.7 Document	_____
1.3 Volunteers (Peer tutors)	
1.3.1 Describe role	_____
1.3.2 Recruit	_____
1.3.3 Train	_____
1.3.4 Establish supervision	_____
1.3.5 Evaluate	_____
1.3.6 Document	_____
1.4 Administrators, managers	
1.4.1 Describe role	_____
1.4.2 Orient	_____
1.4.3 Evaluate	_____
1.4.4 Upgrade, as requested	_____
1.4.5 Document	_____
1.5 Evaluators	
1.5.1 Describe role	_____
1.5.2 Select (internal/external)	_____
1.5.3 Orient	_____
1.5.4 Evaluate	_____
1.5.5 Document	_____
1.6 Students	
1.6.1 Develop orientation modules	
1.6.2 Present orientation	
1.6.3 Evaluate	
1.6.4 Revise	
1.6.5 Document	
2. Courseware	
2.1 On-line	
2.1.1 Input content	_____
2.1.2 Proof content	_____
2.1.3 Pilot	_____

2.1.4 Evaluate
2.1.5 Revise
2.1.6 Document
2.1.7 Install

2.2 Off-line materials, activities
2.2.1 Identify sources
2.2.2 Acquire
2.2.3 Assure accessibility
2.2.4 Pilot
2.2.5 Evaluate
2.2.6 Revise/replace
2.2.7 Document
2.2.8 Install

2.3 Media
2.3.1 Select
2.3.2 Acquire
2.3.3 Pilot
2.3.4 Evaluate
2.3.5 Revise/replace
2.3.6 Document
2.3.7 Install

3. Environment

3.1 Room
3.1.1 Renovate
3.1.2 Wire
3.1.3 Furnish
3.1.4 Evaluate
3.1.5 Renovate further
3.1.6 Document

3.2 Furnishings
3.2.1 Identify
3.2.2 Acquire and arrange
3.2.3 Evaluate
3.2.4 Replace/rearrange
3.2.5 Document

3.3 Schedule
3.3.1 Calculate terminal time needed
3.3.2 Identify terminal locations
3.3.3 Establish schedule posting location(s)
3.3.4 Evaluate schedule utility
3.3.5 Revise schedule and procedures
3.3.6 Document

3.4 Study materials access
3.4.1 Provide storage with access/security
3.4.2 Evaluate
3.4.3 Rearrange/change procedures
3.4.4 Document

4. Communications

4.1 Records
4.1.1 Identify needed data/records
4.1.2 Establish data access
4.1.3 Establish data archive
4.1.4 Document

4.2 Reports

4.2.1 Identify needed reports _____
4.2.2 Establish reporting timetable _____
4.2.3 Establish report format(s) _____
4.2.4 Establish report recipients _____
4.2.5 Document _____

4.3 Telecommunications
4.3.1 Establish communications network _____
4.3.2 Orient users _____
4.3.3 Evaluate utility _____
4.3.4 Document _____

5. Hardware

5.1 Terminals
5.1.1 Identify delivery terminal(s) _____
5.1.2 Develop user orientation _____
5.1.3 Monitor reliability/utility _____
5.1.3 Evaluate _____
5.1.4 Revise orientation/replace terminals _____
5.1.5 Document _____

5.2 Modems/multiplexers
5.2.1 Acquire _____
5.2.2 Install/test
5.2.3 Monitor _____
5.2.4 Evaluate _____
5.2.5 Replace _____
5.2.6 Document _____

5.3 Printers
5.3.1 Acquire _____
5.3.2 Monitor _____
5.3.3 Evaluate _____
5.3.4 Replace _____
5.3.5 Document _____

5.4 Monitors
5.4.1 Acquire _____
5.4.2 Monitor _____
5.4.3 Evaluate _____
5.4.4 Replace _____
5.4.5 Document

ORIENTATION TO C.M.L. (PLATO)

LEARNER'S MODULE

THIS IS WHAT YOU WILL LEARN:	THIS IS HOW YOU WILL LEARN IT:
I Define: a) C.M.L. b) PLATO (P.L.M.) c) Terminal d) Rewrite e) Remediation f) Self-pacing	I Terminology: a) C.M.L.: Computer Managed Learning a system that uses computers to issue and mark post tests, then keep records of student progress through the tests in each course. b) PLATO (P.L.M) Learning Management: a computer system leased to AVC. from U of A. c) Terminal: the screen and keyboard used to communicate with the main computer at U of A. d) Rewrite: post-tests in a module are rewritten until 80% mastery is achieved. e) Remediation: acquiring extra help with the material in a module when not successful after 1 original and 2 rewrites. f) Self-pacing: Students in Level II & III can accelerate or decelerate to a degree, depending on individual need and clinical facility available. Students will choose terminal time that will suit their individual readiness to write post-tests.

THIS IS WHAT YOU WILL LEARN:	THIS IS HOW YOU WILL LEARN IT:
II Discuss the advantages of C.M.L: a) In general b) For Instructors c) For Students	a) In General: i) Reduces time for Clerical duties. ii) Improves Record-Keeping System. iii) Gives more accurate data for evaluation of test items. iv) Provides group assessment of post-test performance. v) Provides information regarding student performance. vi) Supplies random selection of test items by the computer. v) .Inceases protability outside of AVC Edmonton. vi) Increases flexible entry and exit. vii) Increases self-pacing/self-directed components. viii) Manages student testing and record-keeping b) For Instructor i) Brief orientation required. ii) Frees up Instructional time from test marking, for individual student instruction. iii) Provides reliable feedback on individual student progress. iv) Can handle large numbers of students per terminal outside class time.

THIS IS WHAT YOU WILL LEARN:	THIS IS HOW YOU WILL LEARN IT:
	v) Allows for communication between instructors and students via the "message/note" facility. vi) Will allow more time for practical skills practise and assistance with problems. vii) Teacher as facilitator. c) <u>For Students:</u> i) Require only brief orientation to terminal. ii) More independent student choice. iii) Time conservation for students: - some self-pacing in a week. - may choose own times to write. - no waiting for classmates as in in-class writing. - No marking in class. - Immediate feed-back: (correct or incorrect and objective to study if incorrect). iv) Increases motivation to be successful at terminal due to immediate feedback. v) Allows for communication with Instructor via "message/note" system.

THIS IS WHAT YOU WILL LEARN:	THIS HOW YOU WILL LEARN IT
III) Be orientated to the PLATO terminal: a) Scheduling - appt. cards b) Sign-on to terminal c) Terminal use d) Choices e) Lock out - Remediation f) Post-test discussion g) Attendance h) Review of student records i) Messages/Notes j) Test - stop options k) List of key used	a) Scheduling: - Master sign-up sheet in Room 604. - The student can sign up for one or two 15-minute time slots at a time for next day. Not consecutive. - Extra time may be be signed up for up for as the need arises. - If less time is needed the student will remove his/her name from the schedule so someone else may use that 15-minute time slot. - As many post-tests as the student is able to do may be done per 15-minute time-slot. - Terminal sign-up is on a first-come first-serve basis. - Consistant study habits are a must in order to make scheduling decisions. - All post-testing including rewrite must be complete by Friday afternoon otherwise clinical competencies will not be able to be done the next week. - (See appt. Cards) These reminders of times signed-up for, may be filled in at the sign-up time. - If a student forgets his times, someone else could use these slots. - *Changes must always be made on the master sign-up sheet. This is purely student responsibility to get enough time to complete all post-tests. b) Sign-on Terminal: (See screen displays.) Refer to Addendum. - Type your PLATO name. Last name; first initial (no capitals necessary).

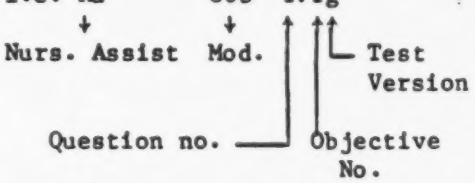
THIS IS WHAT YOU WILL LEARN:	THIS IS HOW YOU WILL LEARN IT:

- Type your PLATO group. Na,1, or 2 or 3 etc.
- See Next Key
- See Shift Stop Key. } during hands on orientation
- Type your password (5 or more digits; letters or numbers). This password must be changed every 60 days.
- Sign-off=shift/stop

c) Terminal Use:

ALWAYS READ ENTIRE SCREEN BEFORE CHOOSING AND PRESSING A KEY.

- See TERM. ANS. Key - pressed after answer choice is made
- You may change your answer ONLY BEFORE you press the ANS. key - once pressed this locks the answer into the computer for processing.
- CORRECT OR INCORRECT is then your feedback. If incorrect you will be told which objective to study.
- The question code is in the top right corner of the screen.
  i.e. Na 86b 1.1g



- Write this code down if you wish to discuss the question later.

d) Choices:

1) Skip option: You may skip a test question and it will reappear at the end of the test for you to answer.

THIS IS WHAT YOU WILL LEARN:	THIS IS HOW YOU WILL LEARN IT:

ii) If you run out of time while doing a test you will sign off [Shift-stop] and resume the test at that point when you next sign on. You must always sign-off when having the terminal so a new student can sign on.

e) Lock-out Remediation:

- You will be allowed to do 3 post-tests on the same module. If still unsuccessful the computer will lock you out of this module for 1 hour which allows time for you to see your Instructor to make an appointment for assistance. Then you can continue testing, on the next module immediately.

f) Post-Test Discussions:

- You may see your Instructor regarding a problem question or in a group if several students are having similar problems.
- Remember to record the question code if you're having problems so your Instructor can refer back to the question.

g) Attendance:

i) In Class is compulsory even if you've already passed the post-test.

ii) Lab attendance is compulsory for demonstration, practise and performance testing.

iii) Clinical attendance
- 7 Extended Care weeks
- 7 Acute Care weeks unless accelerating or decelerating. (This would be explained on an individual basis).

THIS IS WHAT YOU WILL LEARN:	THIS IS HOW YOU WILL LEARN IT:

h) Review of Student Records (See examples) Refer to Addendum.

- Module Index
- "Nursing Assistant Module Post-tests."

i) Messages/Notes

i) From Students to Instructors:
- if having difficulty a student could send a message on the terminal to the instructor.
- See Screen Displays in Addendum.
- Or: While being tested press -Shift/Term. and type comment. Then type your message

ii) From Instructors to Students:
- a message from the Instructor could appear on the screen immediately after you sign-on. ALWAYS READ THE ENTIRE SCREEN CAREFULLY.

j) Test-Stop Option:

- a test will be stopped early if:
  i) you have already incorrectly answered the allowed "quota" per post-test

  ii) you have correctly answered the required number of questions for that module.

k) List of Keys Used:

Next	Erase
Shift	Lab
Stop	Term Answer

ADDENDUM

ORIENTATION TO C.M.L. (PLATO)

INSTRUCTOR'S MODULE

THIS IS WHAT YOU WILL LEARN:	THIS IS HOW YOU WILL LEARN IT:
1. Define: a) C.M.L. (Computer Managed Learning) b) PLATO (PLM) c) Terminal d) Rewrite e) Remediation f) Self-pacing	I Terminology: a) C.M.L.: A system that uses computers to issue and mark post-tests, then keep student records of their progress through the tests in each course. b) (P.L.M.) Plato - Learning Management: is a computer system leased to educational institutions in northern Alberta from U of A. c) Terminal: is made up of a screen and keyboard that allows information to be communicated from the main computer at U of A to the students/Instructors at AVC. d) Rewrite: in competency-based learning the student rewrites post-tests until mastery is achieved. e) Remediation: in the N.A.P. the students will be allowed to rewrite a post-test on one module x 3 at the terminal before they are expected to ask for assistance from their Instructors. Seeking extra help is called "Remediation". f) Self-pacing: as adult learners in a competency-based program there is some provision for working ahead in modules.

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	f) Students in Level II and III may be able to accelerate or decelerate depending on individual need and clinical facility availability. - Students will be, in the school weeks, allowed to choose terminal time that will suite their individual readiness to write post-tests.
(Teacher Only) II <u>Understand the Purpose of CLM in the Nursing Assistant Program</u>	II <u>Background - History</u>: In Sept/79 the Aide-Orderly programs were amalgamated. A new learning system (Modular Competency-Based) was designed and implemented. This is a student self-directed system. In July/85 after re-examination of the goals of this new learning system, it was decided that some were met in a limited manner and some not at all. Therefore a feasibility study into the use of CML was begun. The goals that still needed to and could be met with CML were: 1. Portability to areas outside metropolitan areas. 2. Individualized instruction. 3. Flexible entry and exit. 4. Provisions in environments for self-pacing and self-direction.

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	The study suggested that CML operating and managing student record-keeping and testing would save a ot of Instructional time and effort, plus facilitate meeting the aforementioned goals.
III Discuss the Advantages of CML a) In General b) For Instructors c) For Students	a) In General: CML will: i) Reduce time necessary for routine clerical duties. ii) Improve record-keeping systems. iii) Give greater accessibility to more accurate data for evaluation and analysis of tests. iv) Provide for individual and group assessment and evaluation of post-test performance. v) Supply support for efficient decision-making regarding student progress. vi) Supply random test item selection by the computer/ module. b) For Instructors: i) Requires only brief orientation to the system. ii) Frees instructional time from test administration, marking and tedious discussions.

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	- no hand-recording - 1 x weekly check of individual student and general class progress. iii) Provides reliable feedback - Easy access to comprehensive data on a student, if required. iv) Can handle a large number of students/terminal - outside of class time. v) Allows for constant communication between Instructors and Students via the "message" or "note" facility. vi) Will allow more time for practical skills practise and individual help for students having difficulties. vii) Teacher role - "facilitator" rather than "information giver" c) <u>For Students</u>: i) Requires only brief orientation. ii) Androgogy: more individual, independent student choice. iii) Time conservation per student: - No waiting for classmates - less distractions when writing - No marking test in class

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	iv) Immediate feedback - correct or incorrect - Refers to objective in mod. to study if answer incorrect. v) Increased motivation to do well at the terminals, students receive immediate feedback and reinforcement. vi) Allows for constant communication between instructor and students via "message" or "note" facility
Teacher Objective Only IV <u>Discuss Program Changes with C.M.L.</u> a) Immediate b) Projected	a) <u>Immediate</u>: i) The utilization of post-tests as criteria for progression in program and for determining need for referrals to Learning Specialists remains the same. ii) More student control over testing situation. iii) More emphasis on student self-direction. iv) Record-keeping no longer a time consuming, tedious activity. Once-weekly activity to generate individual and group progress records. More often, only as necessary, for individual students.

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	v) Encourages a re-evaluation of criteria used for Northlands award determination.
	vi) Encourages a re-evaluation of the records being kept to date and their necessity or expendability.
	vii) There will be more class and lab time for practice and perhaps even peer tutoring.
	viii) More emphasis on "practical" component of the program.
	ix) More thorough testing of objectives in modules.
	b) Projected:
	i) Post-tests could become optional, used only as review or study guides. Only major exams and practical skills would then be criteria for progression through program.
	ii) Could increase flexibility of the academic portion of the program, i.e. separate schedules for the accelerated, the average and the decelerated students
	iii) CML area for Health Careers only where format and utilization of environment would be optimal for student independent learning.
	iv) Student self-direction could include peer-tutoring.

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	v) More emphasis on "practical skills" of the program. ?More clinical and less class time, in Levels II and III. vi) Record-keeping will include performance data input on the SPSS System as well as entry of the Clinical Competency file at the completion of each class. vii) Northlands award criteria more heavily weighted in the clinical performance and participation areas. viii) Attendance policy: All students would sign-in then make a choice from several structured situations; as to which to attend, i.e. class, AV media viewing, self-study, practice. Note: All would attend demonstrations and Lab performance situations.
Student and Teacher V Be oriented to the PLATO terminal a) Scheduling - appt. cards b) Sign-on Terminal c) Terminal use d) Choices e) Lock-out-Remediation f) Post-test discussion g) Attendance h) Review of student records (one set for Instructors and one for students) i) Messages j) Test-stop options k) List of keys used	a) Scheduling: - There will be a master sign-up schedule posted in the computer room 604. - The students may sign-up for two 15-minutes time slots at a time (i.e. one for present post-test and one for the next day). If more time is needed for rewrites during the week these are signed for as the need arises. If less time is needed the students are asked to remove their names from

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	the schedule. The students may do as many post-tests in one time slot sequentially as they are able, i.e. the average 10 item post-test takes 5 minutes of computer time to do. Students may sign-up for only one (1) time-slot at a time if they choose. However, terminal sign-up is on a first come, first serve basis.
	- If students prefer morning or afternoon writing times this must be considered when signing up.
	- Consistant planned study habits are a "must" in order to make scheduling decisions.
	- All post-tests for a given week must be completed or successfully by Friday afternoon, otherwise competency experience will be lost in the following clinical week.
	- Appointment note pads will be available for each student (see copy) if they want; to fill in and keep, to remind them of their terminal times.
	- Terminal appointment times must be adhered to or they will be forfeited to the student signed-up after them. They will also have to find another time slot in which to complete post-testing. *The Instructors have no control over this scheduling - it is purely student responsibility to make and keep their appointments.

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	b) Sign-on Terminal: - Student types his PLATO name. The student name will be rostered into the computer; last name then first initial (no capitals necessary). (Show screen displays.) The Instructor will type Instr. - Student types his PLATO group. The student groups will be Na_1, Na_2, Na_3, Na_4, Na_5. (Describe: NEXT key, Shift STOP Key) - Student types his password (password will be individual preference, 5 or more digits; could be numbers or letters). (The Instructor's will be changed from time to time. PLATO prefers everyone's password to be changed every 60 days. c) Terminal Use: NOTE: ALWAYS READ ENTIRE SCREEN BEFORE MAKING CHOICE, OR CHOOSING APPROPRIATE KEY. i) TERM ANS Key is pressed once an answer is made. This locks the answer into the computer and allows the computer to process it. Immediate feedback is given (correct, incorrect - if incorrect the objective in the the module to review is indicated). ii) The QUESTION CODE will be in the top right corner of thescreen, i.e. Na 86b 1.1 g

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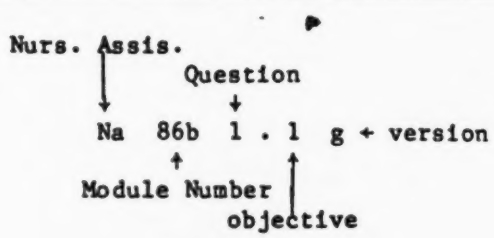

This code needs to be written down by the student in order to refer back to this question for discussion purposes with the Instructor (ie) any type of problem.

iii) Sign off-shift stop

d) Choices:

i) Skip-option - a question may be "skipped" during the course of the test but it will reappear at the end and will then need to be answered.

ii) If the 15-minute time period is up and the student is not finished the test, he/she will "sign-off" [shift STOP] and the next time the student signs on the test will resume at that same question.

Students must always sign-off when leaving the terminal so a new student can sign-on.

e) Lock-out: REMEDIATION

- a student will be allowed to write 3 randomly selected post-tests per module, then will be

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	instructed by the computer to seek assistance from their Instructor. The student is not allowed access to any more post-test attempts until this "lock" is removed - 1 hour later which gives the student the time to make a remediation appointment time. They can sign up for another module post-test immediately. - Automatic record-keeping indicates: i) How much terminal time the student has used. ii) How often each post-test was attempted. iii) Success or incompleteness of each module f) Post-Test Discussions: - will be at the discretion of the Instructors on a team, as to format. - Discussions could be group x 1, 2, 3, etc./week (scheduled) or on an individual basis. - Students must record question code in order to assist the Instructors to find the question for discussion. (Refer to part part (c) Terminal Use (iv) for code description. g) Attendance: i) Classroom is compulsory even if a student has passed a post-test on the module being presently discussed.

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	Attendance is called in the morning and afternoon as usual. ii) Lab attendance is compulsory for all students for demos, practise and performance testing. iii) Clinical attendance requirements remain the same, to fulfill the practical skills portion of the program. h) Review of Student Records: i) For Instructors: - "Nursing Assistant Module Post-tests" (See overheads.) - Curriculum Grp Records, i.e. name, class ABCDEFFG (See overheads.) - average Test Duration (See overheads.) - Individual Student Record, i.e. Mod. Status, Mastered Score, Test (See overheads.) ii) For Student - "Nursing Assistant Module Post-tests" (See overheads.) - Group records will be generated once a week, i.e. on Thursday afternoon so the Tean Leader knows which students need to "catch up" on Friday and

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	who will not be able to do competencies clinically the following week.
	i) Messages: How to Send: i) From Students to Instructor (See overheads.) ii) From Instructor to Student (See overheads.)
	j) Thorough-Testing Capability The computer has been programmed to select a specified number of questions randomly, ensuring all module objectives are thoroughly tested. Early-Test-Stop: - It is possible for a test to stop if the student has answered his/her "limit" of incorrect questions. This 1) saves time, 2) stops a student who needs more review, and 3) keeps the student from seeing the entire bank of questions. - This option can be used if a student has correctly answered the required number of questions as well.
	k) List of keys used: Next Erase Shift Lab Stop Term. Ans.

ATTACHMENT E -- Pretest

E-1

COMPUTER ADAPTATION SCALE

Name _____

Circle:
0 if you DON'T KNOW or HAVE NO OPINION
1 if you STRONGLY DISAGREE
2 if you DISAGREE
3 if you AGREE
4 if you STRONGLY AGREE

	DK	SD	D	A	SA
1. I think using a computer for writing tests would make me nervous.	0	1	2	3	4
2. I think using a computer for writing tests would be easy.	0	1	2	3	4
3. I think using a computer for writing tests would be slower than having them written on paper and marked by the teacher.	0	1	2	3	4
4. I think using a computer for writing tests would be too impersonal.	0	1	2	3	4
5. I think using a computer for writing tests would make me feel too isolated.	0	1	2	3	4
6. I think using a computer for writing tests would be more flexible than paper tests.	0	1	2	3	4
7. I think using a computer for writing tests would be more efficient use of my time.	0	1	2	3	4
8. I think using a computer for writing tests would be satisfying.	0	1	2	3	4
9. I think using a computer for writing tests would be frustrating	0	1	2	3	4
10. I think using a computer for writing tests would be interesting.	0	1	2	3	4
11. I think using a computer for writing tests would improve my knowledge of the subject matter more than regular tests.	0	1	2	3	4
12. I think using a computer for writing tests would be enjoyable.	0	1	2	3	4

COMPUTER ADAPTATION SCALE

Name _____

Circle:
0 if you DON'T KNOW or HAVE NO OPINION
1 if you STRONGLY DISAGREE
2 if you DISAGREE
3 if you AGREE
4 if you STRONGLY AGREE

	DK	SD	D	A	SA
1. I found that using PLATO for writing tests made me nervous.	0	1	2	3	4
2. I found that using PLATO for writing tests was easy.	0	1	2	3	4
3. I found that using PLATO for writing tests was slower than having them written on paper and marked by the teacher.	0	1	2	3	4
4. I found that using PLATO for writing tests was too impersonal.	0	1	2	3	4
5. I found that using PLATO for writing tests made me feel too isolated.	0	1	2	3	4
6. I found that using PLATO for writing tests was more flexible than paper tests.	0	1	2	3	4
7. I found that using PLATO for writing tests was more efficient use of my time.	0	1	2	3	4
8. I found that using PLATO for writing tests was satisfying.	0	1	2	3	4
9. I found that using PLATO for writing tests was frustrating	0	1	2	3	4
10. I found that using PLATO for writing tests was interesting.	0	1	2	3	4
11. I found that using PLATO for writing tests improved my knowledge of the subject matter more than regular tests.	0	1	2	3	4
12. I found that using PLATO for writing tests was enjoyable.	0	1	2	3	4

Attachment G

PRE-USE QUESTIONNAIRE RESULTS

"I THINK USING A COMPUTER FOR TESTING --"	CLASS START DATE: OCT. 86 N	OCT. 86 %	DEC. 86 N	DEC. 86 %	FEB. 87 N	FEB. 87 %	TOTAL N	TOTAL %
-- WOULD MAKE ME NERVOUS								
DISAGREE	10	16%	12	19%	13	21%	35	56%
AGREE	11	18%	7	11%	9	15%	27	44%
-- WOULD BE EASY								
DISAGREE	4	7%	5	8%	1	2%	10	17%
AGREE	17	28%	14	23%	19	32%	50	83%
-- WOULD BE SLOWER THAN PAPER AND PENCIL								
DISAGREE	27	33%	25	31%	23	28%	75	93%
AGREE	1	1%	2	2%	3	4%	6	7%
-- WOULD BE TOO IMPERSONAL								
DISAGREE	21	29%	22	30%	20	27%	63	86%
AGREE	3	4%	2	3%	5	7%	10	14%
-- WOULD MAKE ME FEEL TOO ISOLATED								
DISAGREE	24	30%	27	34%	24	30%	75	95%
AGREE	2	3%			2	3%	4	5%
-- WOULD BE MORE FLEXIBLE								
DISAGREE	10	13%	7	9%	10	13%	27	35%
AGREE	18	22%	19	25%	13	17%	50	65%
-- WOULD BE MORE EFFICIENT USE OF TIME								
DISAGREE	3	4%	2	2%			5	6%
AGREE	24	29%	27	33%	26	32%	77	94%
-- WOULD BE SATISFYING								
DISAGREE	3	4%	2	3%	2	3%	7	10%
AGREE	17	22%	25	37%	19	28%	61	90%
-- WOULD BE FRUSTRATING								
DISAGREE	19	26%	23	32%	20	28%	62	86%
AGREE	4	6%	2	3%	4	6%	10	14%
-- WOULD BE INTERESTING								
DISAGREE	2	2%	2	2%			4	5%
AGREE	25	30%	27	32%	28	33%	80	95%
-- WOULD IMPROVE MY KNOWLEDGE OF THE SUBJECT								
DISAGREE	8	16%	8	16%	8	16%	24	48%
AGREE	8	16%	10	20%	8	16%	26	52%
-- WOULD BE ENJOYABLE								
DISAGREE	2	3%	1	1%			3	4%
AGREE	22	31%	25	35%	21	30%	68	96%

POST-USE QUESTIONNAIRE RESULTS

"I FOUND USING A COMPUTER FOR TESTING --"	CLASS START DATE: SEPT. 86 N	SEPT. 86 %	OCT. 86 N	OCT. 86 %	DEC. 86 N	DEC. 86 %	FEB. 87 N	FEB. 87 %	TOTAL N	TOTAL %
-- MADE ME NERVOUS										
DISAGREE	10	10%	18	18%	18	18%	20	20%	66	65%
AGREE	8	8%	7	7%	9	9%	11	11%	35	35%
-- WAS EASY										
DISAGREE	6	6%	1	1%	6	6%	4	4%	17	17%
AGREE	14	14%	22	22%	20	20%	27	27%	83	83%
-- WAS SLOWER THAN PAPER AND PENCIL										
DISAGREE	16	16%	25	25%	26	26%	30	30%	97	96%
AGREE	2	2%			1	1%	1	1%	4	4%
-- WAS TOO IMPERSONAL										
DISAGREE	15	16%	22	23%	22	23%	29	31%	88	94%
AGREE	3	3%			3	3%			6	6%
-- MADE ME FEEL TOO ISOLATED										
DISAGREE	17	17%	23	23%	25	25%	28	28%	93	93%
AGREE	1	1%	2	2%	2	2%	2	2%	7	7%
-- WAS MORE FLEXIBLE										
DISAGREE	6	6%	5	5%	6	6%	8	8%	25	26%
AGREE	11	11%	20	21%	20	21%	21	22%	72	74%
-- WAS MORE EFFICIENT USE OF TIME										
DISAGREE	3	3%			2	2%	3	3%	8	8%
AGREE	15	15%	24	24%	25	25%	27	27%	91	92%
-- WAS SATISFYING										
DISAGREE	4	4%	3	3%	4	4%	3	3%	14	14%
AGREE	17	17%	20	20%	23	23%	26	26%	86	86%
-- WAS FRUSTRATING										
DISAGREE	14	15%	14	15%	20	21%	26	27%	74	77%
AGREE	4	4%	9	9%	6	6%	3	3%	22	23%
-- WAS INTERESTING										
DISAGREE	1	1%	1	1%					2	2%
AGREE	18	19%	23	24%	24	25%	30	31%	95	98%
-- IMPROVED MY KNOWLEDGE OF THE SUBJECT										
DISAGREE	8	10%	9	11%	4	5%	8	10%	29	36%
AGREE	9	11%	6	8%	17	21%	19	24%	51	64%
-- WAS ENJOYABLE										
DISAGREE	5	5%	1	1%	2	2%	1	1%	9	9%
AGREE	13	14%	22	23%	23	24%	28	29%	86	91%

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